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PROBLEMS FOR SOLUTION.

ALGEBRA.

250. Proposed by **PROFESSOR WILLIAM HOOVER, Ph. D.,** Athens, Ohio.

Factor $a^2b^2(x^2+y^2)(a^2y^2+b^2x^2-a^2b^2)=(a^4y^2+b^4x^2)[\sqrt{(a^2y^2+b^2x^2)}+ab]^2$.

251. Proposed by **S. A. COREY,** Hiteman, Iowa.

Prove that $\dfrac{1}{n+1}+\dfrac{1}{2(n+2)}+\dfrac{1}{3(n+3)}+$ etc.,$=$

$$\frac{1}{n^2}+\tfrac{1}{2}\left[\frac{1}{n-1}+\frac{1}{2(n-2)}+\frac{1}{3(n-3)}+\dots\dots+\frac{1}{l(n-l)}\right],$$

l being equal to $(n-1)$, n being any positive integer greater than one.

252. Proposed by **L. E. NEWCOMB,** Los Gatos, Cal.

Solve (1) $x-y=\frac{1}{3}\pi$; (2) $\sin x=\cos^3 y$.

AVERAGE AND PROBABILITY.

174. Proposed by **HENRY HEATON,** Atlantic, Iowa.

Chords are drawn through every point of the surface of a given circle in every possible direction. What is their average length?

175. Proposed by **R. D. CARMICHAEL,** Hartselle, Ala.

If a line l is divided into three parts by two points taken at random on it, what is the mean value of the triangle whose sides are equal to the three parts? (Only those cases are to be considered in which the the three parts will form a triangle.)

CALCULUS.

212.* Proposed by **O. E. GLENN, Ph. D.,** Springfield, Mo.

Show that any root of the equation $y^5-5y=4x$ satisfies the differential equation $\dfrac{d^4y}{dx^4}=(\frac{4}{5})^4x^{-3}\dfrac{d^4(x^{-\frac{1}{5}}y)}{d(x^{-\frac{4}{5}})^4}$. Generalize the problem.

213. Proposed by **EDWIN L. RICH,** Schenectady, N. Y.

Let $f(x)$ be any function of x, and $f'(x)$ its derivative. If $u=[f'(x)]^{-\frac{1}{2}}$, $v=f(x)[f'(x)]^{-\frac{1}{2}}$, then $\dfrac{1}{u}\dfrac{d^2u}{dx^2}-\dfrac{1}{v}\dfrac{d^2v}{dx^2}=0$.

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*The problem is due to Heymann.